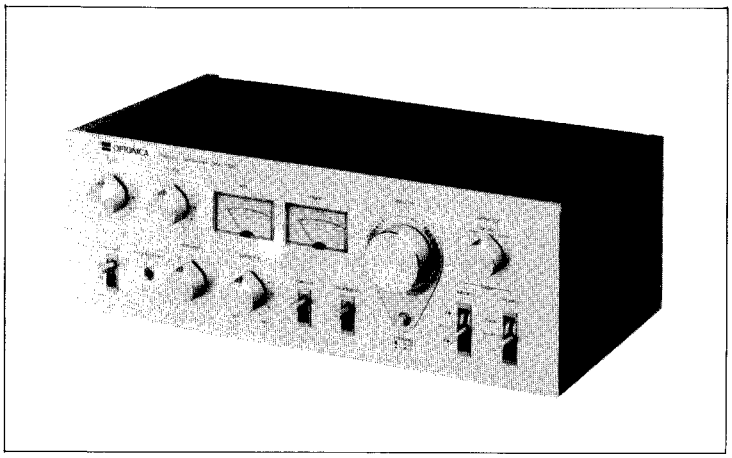
SHARP OPTONICA **SERVICE MANUAL**

SM-1515H



MODEL SM-1515H

In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used.

SPECIFICATIONS

GENERAL DESCRIPTION

Power source:	AC 110/220/240V, 50/60Hz
Power consumption:	270 W
Semiconductors:	2-IC (Integrated circuit) 24-Transistor 2-FET 17-Diode
Dimensions:	Width: 408 mm (16-1/16") Height: 144 mm (5-11/16") Depth: 253 mm (9-31/32")
Weight:	7.5 kg (16.5 lbs.)

MAIN AMPLIFIER

Circuit:	Differential amplifier, complimentary system, OCL (Output Capacitor-Less)
Continuous power output:	2 x 45W/4 ohms, Both channels driven at 1 kHz, 0.2% distortion 2 x 40W/8 ohms, Both channels driven at 1 kHz, 0.3% distortion
Intermodulation distortion:	0.05% at 20 W
Damping factor:	more than 40 (at 1 kHz, 8 ohms)
Power bandwidth:	20 Hz ~ 30 kHz
Frequency response:	15 Hz ~ 60 kHz $^{+1dB}_{-3dB}$

PRE-AMPLIFIER

Circuit:	Direct coupled equalizer circuit, 'NF' type tone control
Input sensitivity and input impedance:	
PHONO:	2.5 mV/50k ohms
AUX:	150 mV/50k ohms
TUNER:	150 mV/50k ohms
TAPE PB 1 and 2:	150 mV/50k ohms
TAPE PB (DIN socket):	150 mV/50k ohms
Output level and loaded impedance:	
REC 1 and 2:	150 mV/50k ohms
REC (DIN socket):	30 mV/80k ohms
Phono overload:	220 mV (RMS, 1 kHz, 0.1% THD)
RIAA curve deviation:	±0.4 dB
Frequency response:	15 Hz ~ 60 kHz $^{+1\ dB}_{-3\ dB}$ (TAPE, AUX, TAPE PB)
Tone control:	
Bass:	±9 dB at 100 Hz
Treble:	±9 dB at 10 kHz
Low cut filter:	−3 dB at 30 Hz, 6 dB/oct

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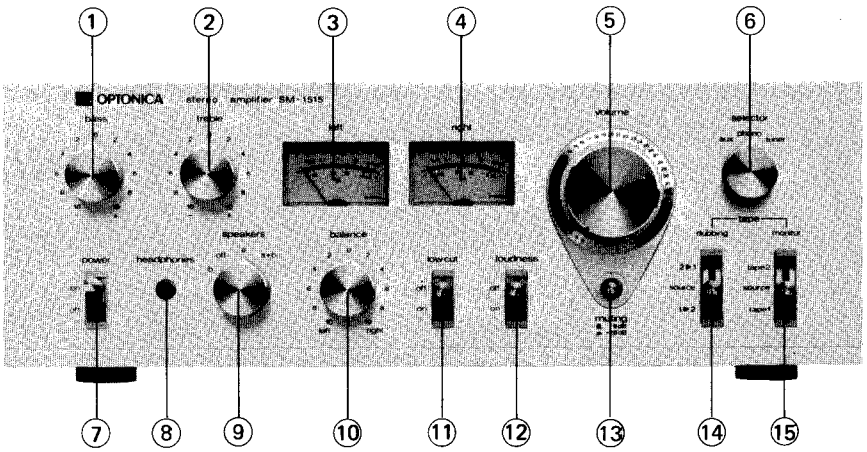
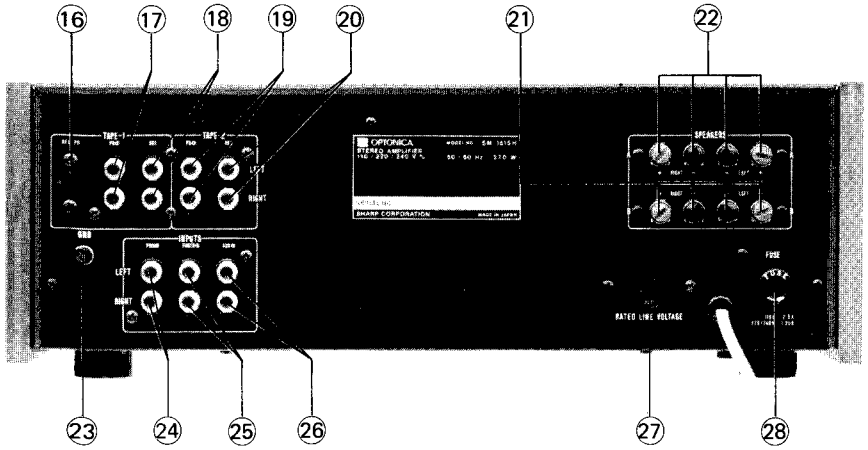
LAYOUT OF FRONT PARTS



① Bass Control
② Treble Control
③ Output Meter (Left)
④ Output Meter (Right)
⑤ Volume Control
⑥ Function Selector
⑦ Power Switch
⑧ Headphones Jack
⑨ Speakers Switch
⑩ Balance Control
⑪ Low Cut Switch
⑫ Loudness Switch
⑬ Muting Switch
⑭ Tape-Dubbing Switch
⑮ Tape-Monitor Switch

Figure 1

LAYOUT OF REAR PARTS



⑯ REC/PB (DIN) Socket
⑰ Tape 1 (Playback) Jack
⑱ Tape 1 (Recording output) Jack
⑲ Tape 2 (Playback) Jack
⑳ Tape 2 (Recording output) Jack
㉑ Speakers Terminal B
㉒ Speakers Terminal A
㉓ GND Terminal
㉔ Input (Phono) Jacks
㉕ Input (Tuner) Jacks
㉖ Input (Auxiliary) Jacks
㉗ Mains Voltage Selector Socket
㉘ Fuse Holder

Figure 2

SHARP OPTONICA SERVICE MANUAL

MODEL
SM-1515HB

In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used.

The model SM-1515HB is totally the same as the model SM-1515H except for the following and in handling the SM-1515HB it is therefore recommendable to refer to "Service Manual for SM-1515H" except for a minor difference.
Since some erroneous descriptions are found in "SM-1515H Service Manual", refer to "Modification of SM-1515H Service Manual" for correction.

DIFFERENCE BETWEEN SM-1515H AND SM-1515HB

SM-1515H		SM-1515HB		DESCRIPTION
PARTS NO.	CODE	PARTS NO.	CODE	
GCOVA1075AFSC		GCOVA1075AFSB		Cover, Tape-Dubbing/Tape-Monitor
GCOVA1076AFSC		GCOVA1076AFSB		Cover, Power/Low Cut/Loudness
HPNLC3274AFSA		HPNLC3274AFSB		Front Panel
PSPAS0008SGSA		PSPAS0008SGSB		Spacer, Muting Knob
LANGQ0506AFSA		LANGQ0542AFSA		Bracket, Terminal
JKNBM0136AFSE	AC	JKNBM0136AFSD		Knob, Muting
JKNBN0316AFSA	AK	JKNBN0316AFSC		Knob, Volume
JKNBN0330AFSA	AH	JKNBN0330AFSB		Knob, Bass/Treble/Speakers/Balance/Selector
JKNBP0070AFSA	AH	JKNBP0070AFSC		Knob, Power/Low Cut/Loudness/Tape-Dubbing/ Tape-Monitor
SPAKC0981AFZZ		SPAKC1053AFZZ		Packing Case
PCOVZ8050AFZZ		PCOVZ8109AFZZ		Cover, Output Meter Lamp

MODIFICATION OF SM-1515H SERVICE MANUAL

REF. NO.	OLD PARTS NO.	NEW PARTS NO.	DESCRIPTION	REASON	EFFECTIVE FROM
D403	VHD10EI////-F	VHD10EI////-I	Power Rectifier (10E-I)	Correction	
	LBSHZ0001AF00		Bushing, Output Meter Lamp	Abolition	AUG. 1977
	PREFL0058AFZZ		Panel, Output Meter	Abolition	AUG. 1977
		PCUSS0005AG00	Sheet, Noise Cut, Top Cabinet	Addition	MAR. 1977

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SHARP OPTONICA MANUEL DE SERVICE

MODELE
SM-1515HB

Dans l'intérêt de l'utilisateur, l'appareil devra être reconstitué dans sa forme première, et seules des pièces identiques à celles qui sont spécifiées devront être utilisées.

Le modèle SM-1515HB est entièrement identique au modèle SM-1515H à l'exception du suivant et en ce qui concerne la manipulation du SM-1515HB il est donc recommandable de se reporter au "Manuel de Service du SM-1515H" à part d'une mineure différence.
Etant donné qu'il y a quelques descriptions erronées dans le "Manuel de Service du SM-1515H", reportez-vous à la "Modification du Manuel de Service du SM-1515H" pour la correction.

DIFFERENCE ENTRE SM-1515H ET SM-1515HB

SM-1515H		SM-1515HB		DESCRIPTION
N° DE LA PIECE	CODE	N° DE LA PIECE	CODE	
GCOVA1075AFSC		GCOVA1075AFSB		Couvercle, Copie de bande/ Contrôle auditif
GCOVA1076AFSC		GCOVA1076AFSB		Couvercle, Alimentation/Filtre des basses fréquences/ Compensateur physiologique
HPNLC3274AFSA		HPNLC3274AFSB		Panneau frontal
PSPAS0008SGSA		PSPAS0008SGSB		Entretoise, bouton de réglage silencieux
LANGQ0506AFSA		LANGQ0542AFSA		Collier de fixation, Borne
JKNBM0136AFSE	AC	JKNBM0136AFSD		Bouton, Réglage silencieux
JKNBN0316AFSA	AK	JKNBN0136AFSC		Bouton, Volume
JKNBN0330AFSA	AH	JKNBN0330AFSB		Bouton, Graves/Aigus/Haut-parleurs/Equilibre/Sélecteur
JKNBP0070AFSA	AH	JKNBP0070AFSC		Bouton, Alimentation/Filtre des basses fréquences/ Compensateur physiologique/Copie de bande/Contrôle auditif
SPAKC0981AFZZ		SPAKC1053AFZZ		Boîtier d'emballage
PCOVZ8050AFZZ		PCOVZ8109AFZZ		Couvercle, Métre sortie

MODIFICATION DU MANUEL DE SERVICE DU SM-1515H

N° DE REF.	N° DE L'ANCIENNE PIECE	N° DE LA NOUVELLE PIECE	DESCRIPTION	RAISON	MISE EN VIGUEUR A PARTIR DE
D403	VHD10EI////-F	VHD10EI////-I	Redresseur d'alimentation (10E-I)	Correction	
	LBSHZ0001AF00		Capot protecteur, Lampe d'indicateur de sortie	Abolition	AOUT 1977
	PREFL0058AFZZ		Panneau, Indicateur de sortie	Abolition	AOUT 1977
		PCUSS0005AG00	Plaque, Elimination de bruit, Coffret supérieur	Addition	MAR. 1977
	PCQVZ8050AFZZ	PCOVZ8050AFZZ	Couvercle, mètre sortie	Correction	

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DISASSEMBLY (See Figure 3)

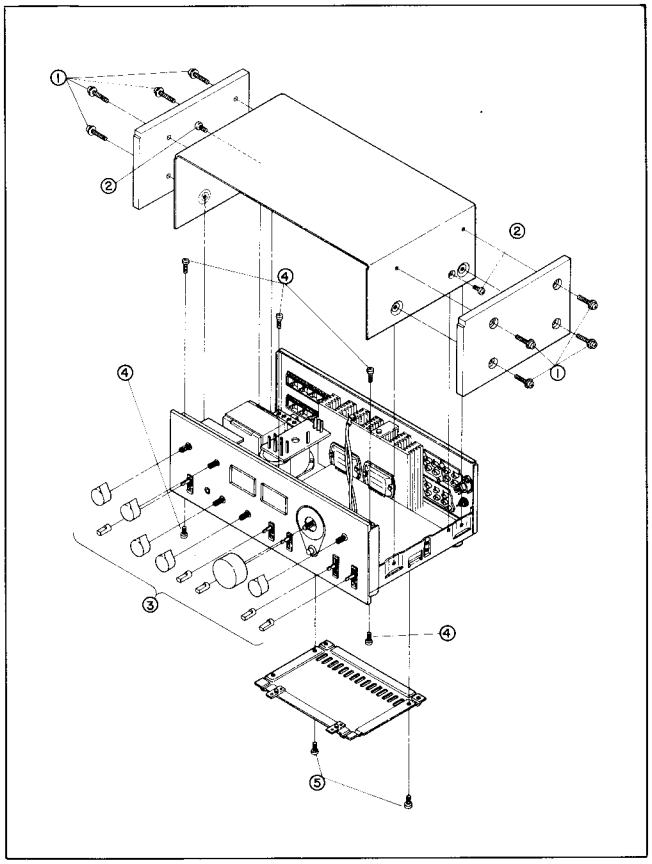


Figure 3

HOW TO REMOVE THE CABINET:
Remove the 8 screws ① retaining the side plates (4 screws each for the both plates) and take out the side plates.
Remove the 2 screws ② retaining the cabinet (1 screw each in right and left) and lift up the cabinet to remove it.

HOW TO REMOVE THE FRONT PANEL:
Draw out the 11 knobs ③ from the front panel and remove the 5 screws ④ retaining the front panel.
Then pull the front panel toward you to remove it.

HOW TO REMOVE THE BOTTOM PLATE:
Turn over the set, remove the 2 screws ⑤ retaining the bottom plate and lift up the bottom plate to remove it.

PREPARATION FOR USE

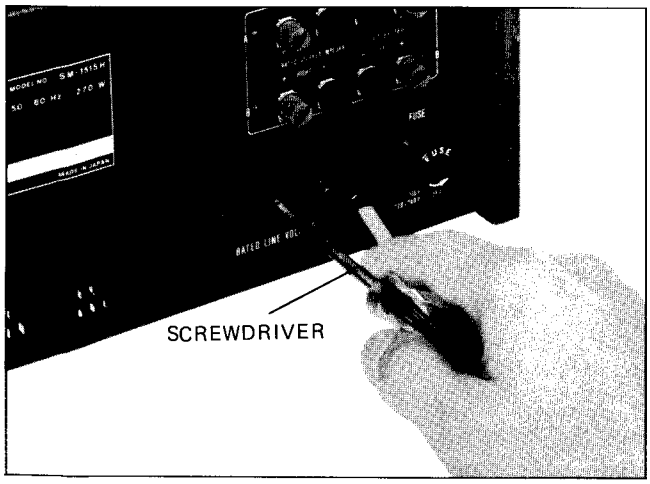


Figure 4

VOLTAGE SELECTION (See Figure 4)
Check the preset voltage before connecting the mains plug to a mains outlet. If the setting is different from your local supply mains voltage, the selector must be reset as follows. Rotate the voltage selector by using a screwdriver so that your local voltage number can be seen.

BLOCK DIAGRAM

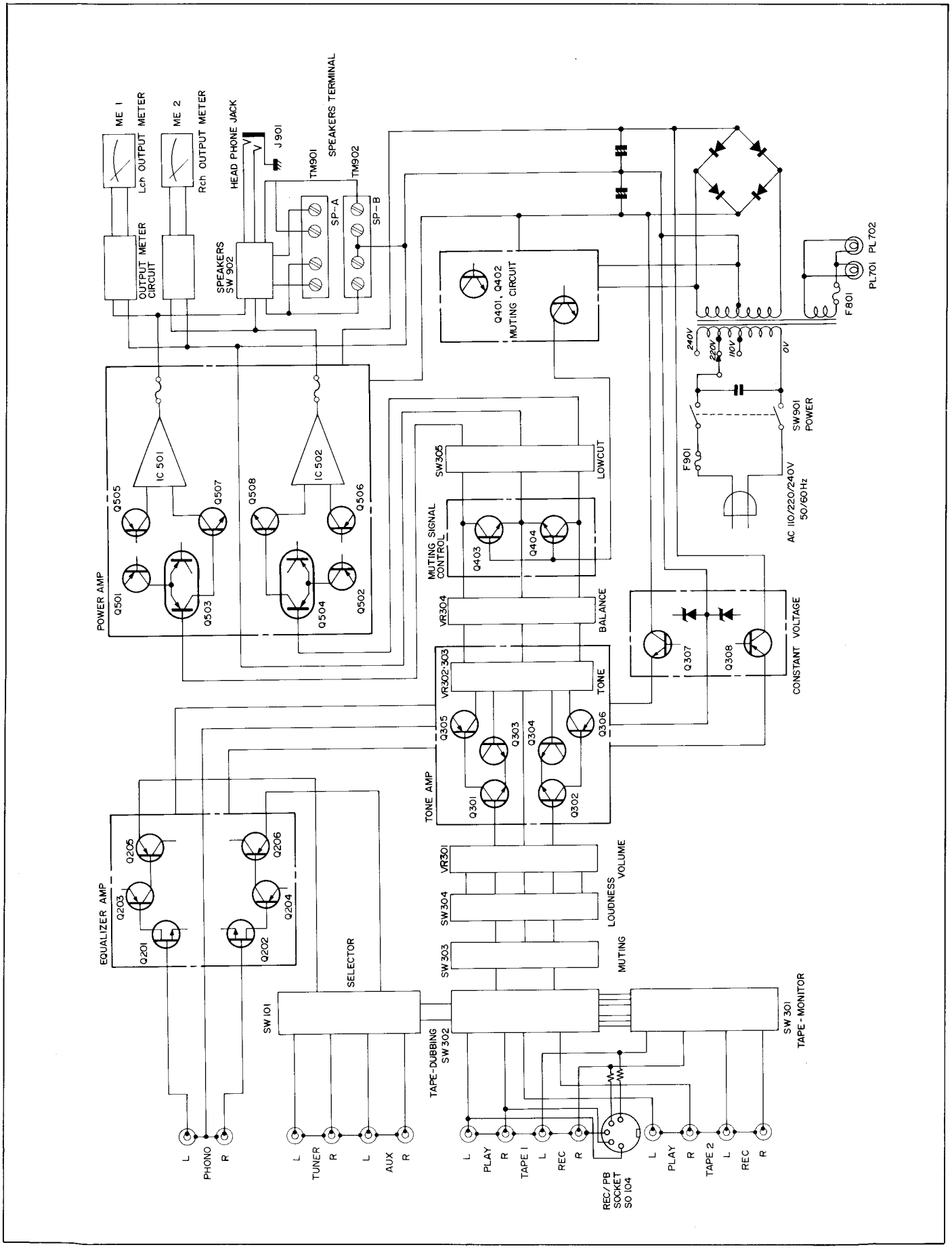


Figure 5

CIRCUIT DISCRIPTION

Note: Hereunder given are the explanations on the behavior of various circuits; main amplifier circuit, meter circuit, electronic muting circuit, meter circuit, electronic muting circuit and equalizer circuit.
In which, note that the following symbols will be used in the descriptions:
Q : Transistor R : Resistor C : Capacitor IC : Integrated circuit ME : Output meter
PTH : Positive characteristic thermistor

■ MAIN AMPLIFIER CIRCUIT (See Figure 6)

This main amplifier is of a differential 1-stage pure complementary circuit and besides it incorporates Darlington power pack (made of IC501 and IC502) in which the drive stage and power stage are integrated into one unit. The bias circuit is incorporated in the Darlington pack and it assures a more stabilized and readjustment-free function of the amplifier. Moreover, this circuit scarcely is affected by the power voltage variations since it employs a current regulator circuit for the common emitter power source of the differential amplification stage.
The pre-drive transistors Q507 and Q508 are a current regulator circuit, which assures a higher gain and a lower distortion. To the bases of these transistors Q505 and Q506 are connected C511, C512, R513 and R514 and thus a rise time of Q505 and Q506 is delayed so that there will be no shock noises at the speaker.

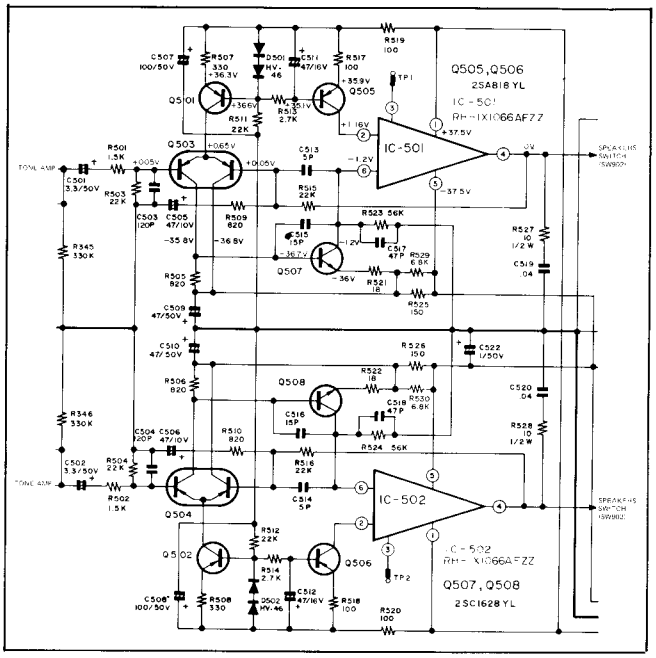


Figure 6

■ METER CIRCUIT (See Figure 7)

With this meter circuit, output signals (from the pin ④ of IC501 and pin ④ of IC502) of the main amplifier are converted into DC signals to undergo logarithmic amplification and thus it becomes possible to drive the output meters ME1 and ME2.
The AC output signals of the main amplifier are supplied to D603 and D604 where their negative components are removed. Then the signals undergo logarithmic amplification through D605 and D606, thus driving the output meters. D601 and D602 are to prevent D603 and D604 from being reverse-biased. C601 and C602 are a speed-up capacitor to increase response speed of the output meters.

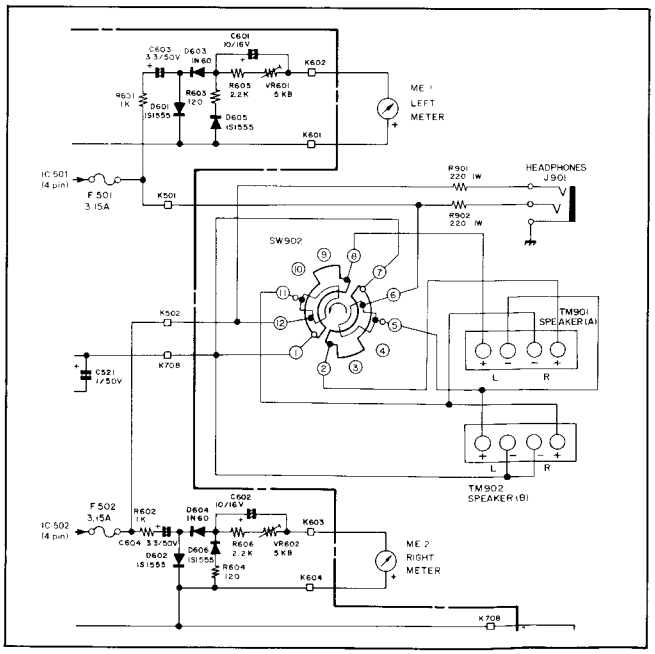


Figure 7

■ MUTING CIRCUIT (See Figure 8)

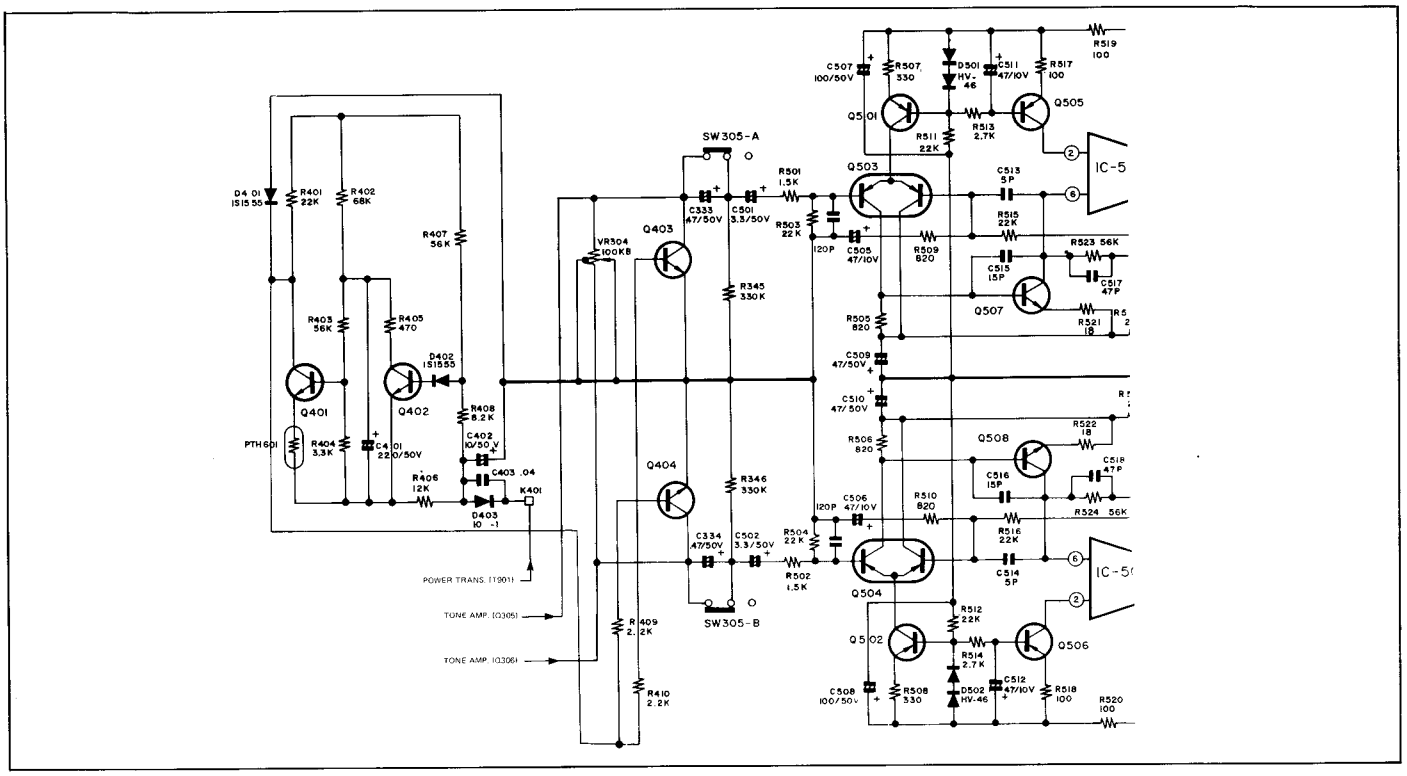


Figure 8

The electronic muting circuit is composed of transistors Q401 to Q404, diodes D401 to D403 and other resistors and capacitors and it works to prevent an occurrence of noises when the power switch SW901 is turned on or off, and to eliminate an abnormal thermal increase of the heat sink.

When the power switch is turned "ON"

The muting circuit works as follows;
A current runs in the bases of Q403 and Q404 through R401 and thus inputs to the main amplifier are shorted so that the signals of the tone amplifier won't enter the main amplifier. At the same time, a current also runs in R402 and C401 and so the base potential of Q401 increases until the Q401 is eventually turned on, so that a collector current will be produced. As a result, a voltage drop of R401 becomes drastic so that there will be no current caused at the bases of Q403 and Q404. Thus it is allowed for the main amplifier to receive signals.

When the power switch is turned "OFF"

The muting circuit works as follows;
The negative potential which has been charged in C402 becomes zeronized instantly and so the emitter potential of Q401 is increased to turn off the Q401. As a result, a current runs in the bases of Q403 and Q404 so that these transistors are turned on; this results in that no signal will enter the main amplifier.
Q402 is to discharge the C401 which has been once charged up when the power switch was turned off.

When temperature of the heat sink abnormally increases

The muting circuit works as follows;
If the heat sink of IC501 and IC502 are over-heated, the resistance of PTH601 is suddenly increased. As a result, the current of Q401 is reduced while its collector potential is increased so that the transistors Q403 and Q404 are turned on; this results in that no signals will enter the main amplifier so that an abnormal thermal increase of the heat sink can be eliminated.

■ EQUALIZER CIRCUIT (See Figure 9)

The equalizer circuit is powered by the two-power-supply (+19.7V, −19.7V) system.
Q201 and Q202 in the first stage are high-amplification and low-noise type FET and input signals to these transistors are directly coupled with the second stage.
Q203 and Q204 in the second stage are low-noise transistor, in which almost all of the gains for the equalizer circuit are assured. The third stage is composed of Q205 and Q206 and it includes DC load resistor R213 and R214: the resistance of this resistor is limited to the minimum to assure signal inputs in a higher frequency range. C217 and C218 are boot strap capacitors which are to increase the gains of the second stage transistors Q203 and Q204 and to improve the linearity.

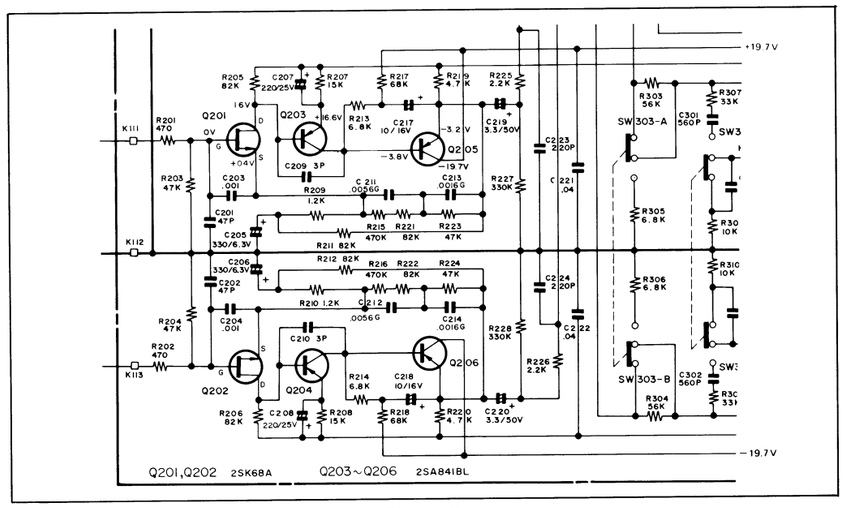


Figure 9

IC OUTPUT CIRCUIT (See Figure 10)

When replacing it, be sure to apply silicone grease on the surface of IC which is in contact with the heat sink, evenly and as sparingly as possible.

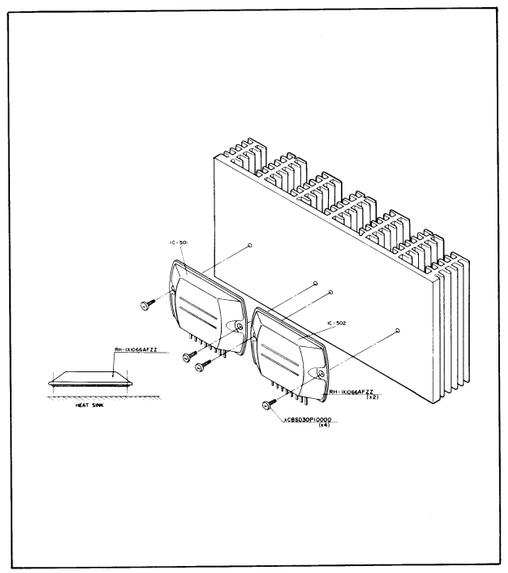


Figure 10

ADJUSTMENT OF MAIN AMP CIRCUIT (See Figure11 and 12)

1. Check the power supply voltage.
2. Set the power switch SW901 to "ON" position.
3. Set the volume control to "0" position.
4. • Check that the potential between the test point TP1 and K501 is 12mV to 60mV.
   • Check that the potential between the test point TP2 and K502 is 12mV to 60mV.
   • Check that the potential between K501 and earth is in the range of +50mV to −50mV
   • Check that the potential between K502 and earth is in the range of +50mV to −50mV.
   • Check that the potential between Q307 emitter and earth is +20V.
   • Check that the potential between Q308 emitter and earth is −20V.
   • Check that the potential between K706 and earth is +39V.
   • Check that the potential between K708 and earth is −39V.
5. By using a signal generator (1kHz, 300mV), apply signals to the terminal AUX located at the rear of the set and adjust the volume control and balance control so that the output signal of the speaker terminal (A or B) becomes 1W = 2.0V. (See Figure 11)
6. Adjust VR601 (and/or VR602) so that the left channel output meter (and/or the right channel output meter) will indicate 1W.

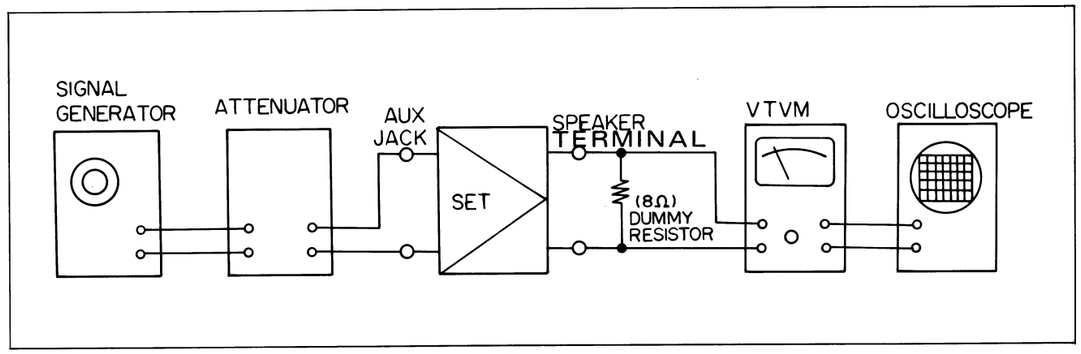


Figure 11

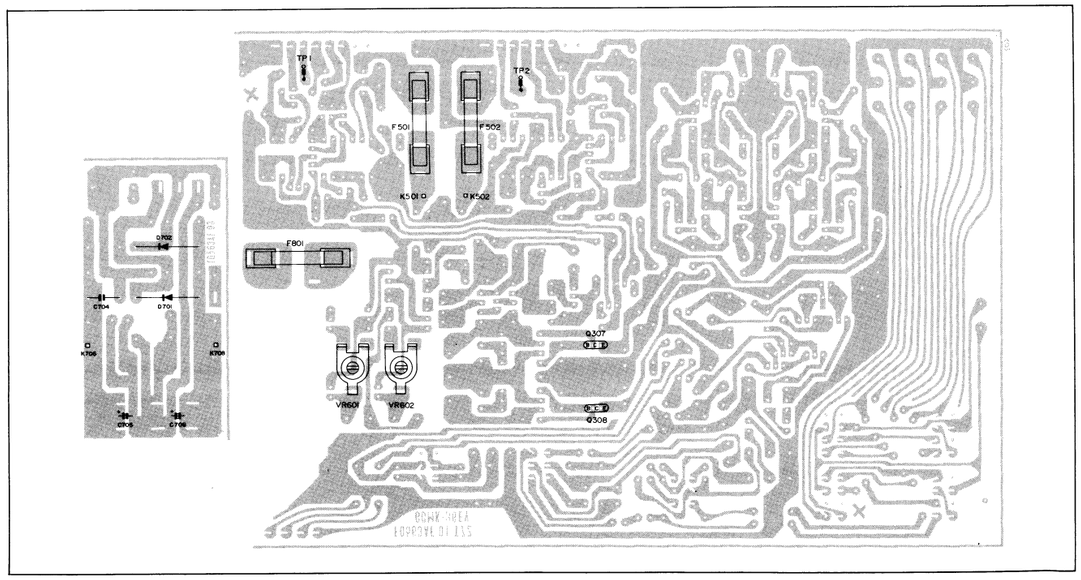


Figure 12

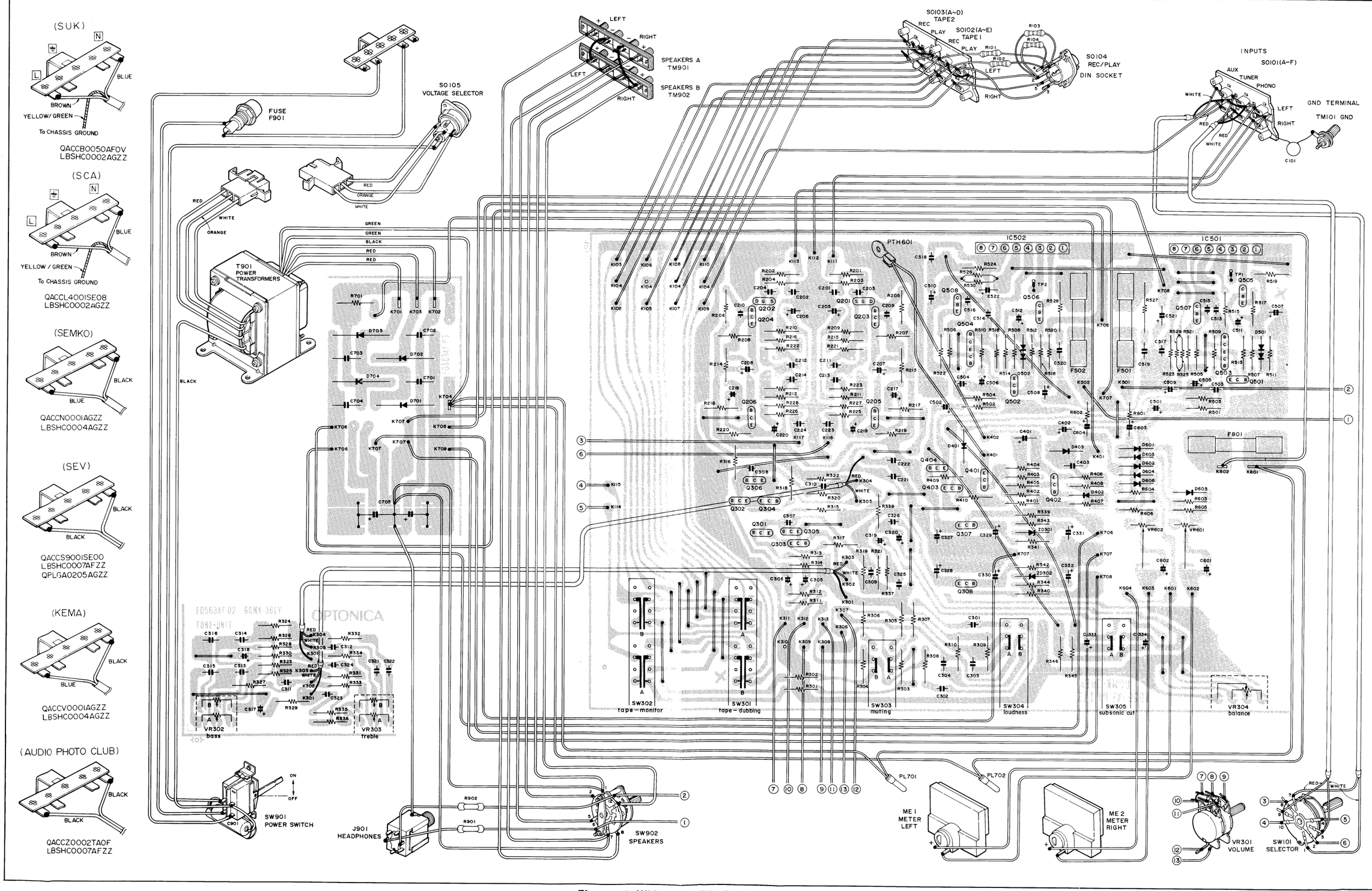
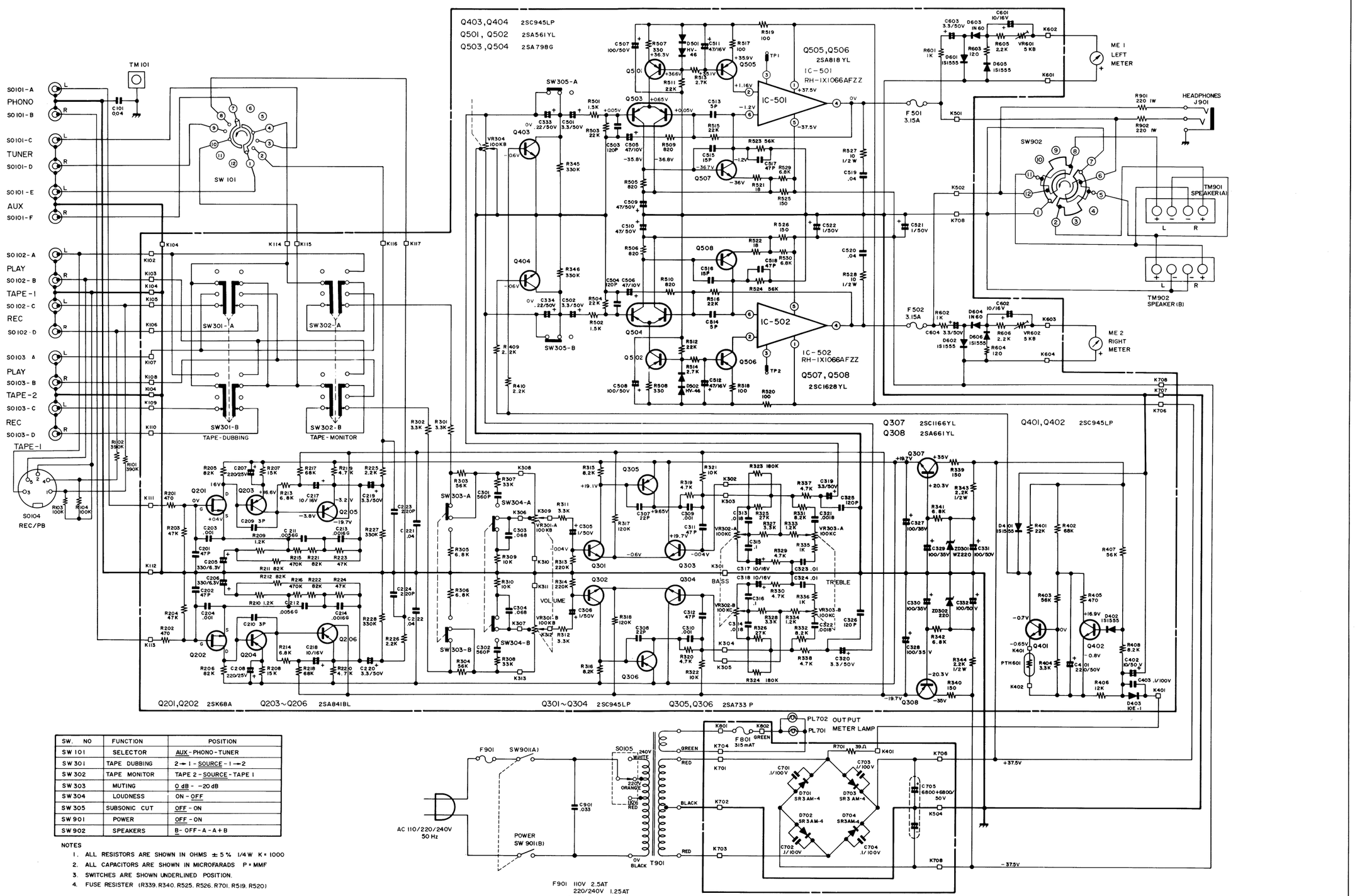


Figure 13 WIRING SIDE OF P.W. BOARD



SW. NO	FUNCTION	POSITION
SW 101	SELECTOR	AUX - PHONO - TUNER
SW 301	TAPE DUBBING	2 → 1 - SOURCE - 1 → 2
SW 302	TAPE MONITOR	TAPE 2 - SOURCE - TAPE 1
SW 303	MUTING	0 dB - −20 dB
SW 304	LOUDNESS	ON - OFF
SW 305	SUBSONIC CUT	OFF - ON
SW 901	POWER	OFF - ON
SW 902	SPEAKERS	B - OFF - A - A+B

NOTES

1. ALL RESISTORS ARE SHOWN IN OHMS ± 5 % 1/4 W K = 1000
2. ALL CAPACITORS ARE SHOWN IN MICROFARADS P = MMF
3. SWITCHES ARE SHOWN UNDERLINED POSITION.
4. FUSE RESISTER (R339, R340, R525, R526, R701, R519, R520)

(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 14 SCHEMATIC DIAGRAM

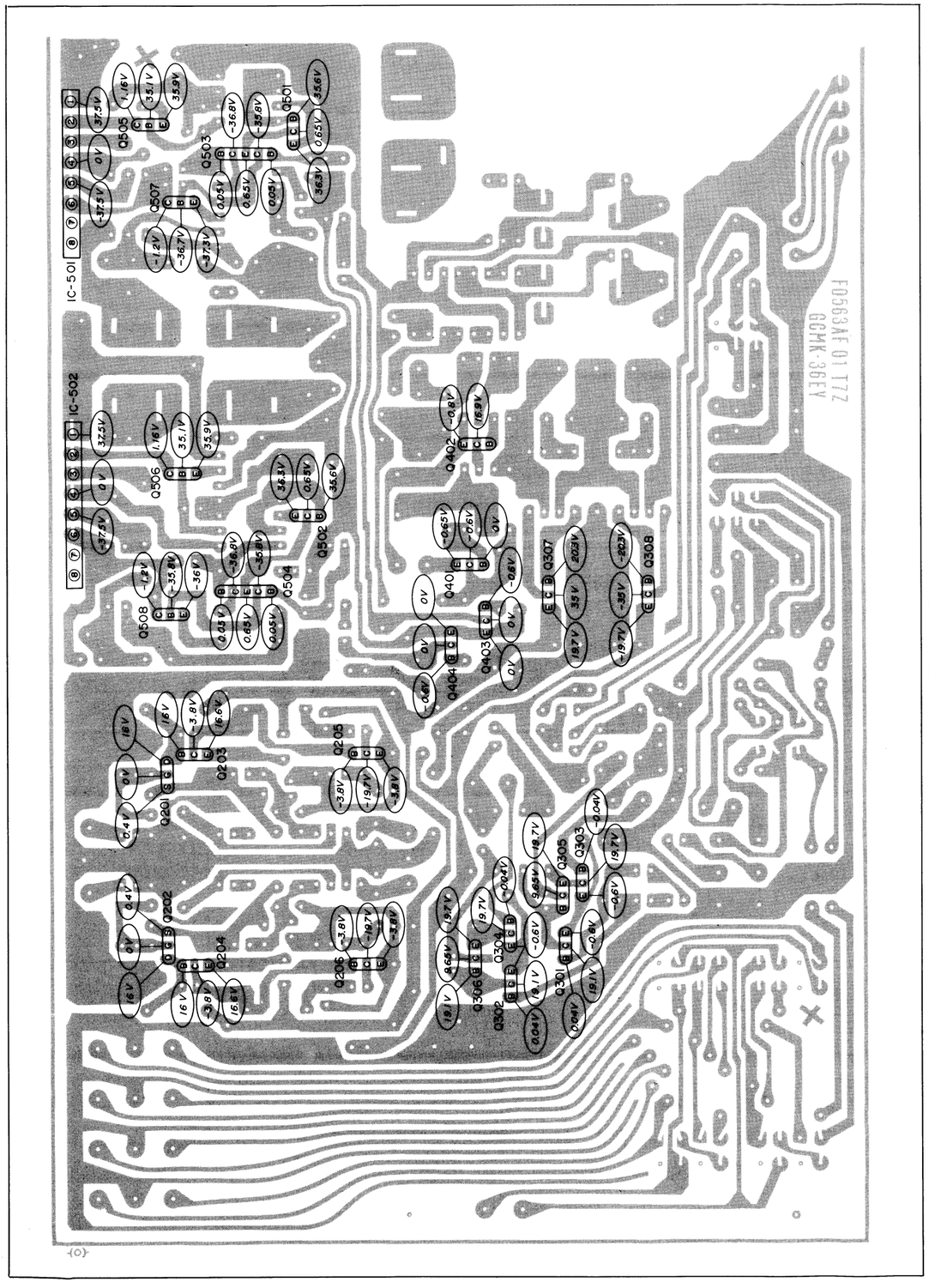


Figure 15

TROUBLE SHOOTING CHART

PHENOMENON	CAUSE	COUNTERMEASURE
The meter lights do not light up even with the power switch set to 'on'.	Insertion of the power cord plug to a wall outlet is incomplete.	Reinsert the power cord plug into a wall outlet completely.
No sound comes out of the speaker.	The speakers switch is kept at 'off'.	Set the speakers switch to 'a' or 'b'.
	The volume control is kept closed.	Rotate the volume control to increase the sound volume.
	The speaker cord is shortcircuited.	Make sure the speaker cord is not shortcircuited.
	Setting position of the selector switch is improper.	Set the selector switch to a proper position.
	The setting position of tape monitor switch is improper.	Set the tape monitor switch to a proper position.
Sound comes out of only one of two loudspeakers.	The balance control is set one-sided (right or left).	Set the balance control so as to balance both channels.
	Connection of a loudspeaker is improper.	Connect the speaker cord to the speaker terminal completely.
	Connection of the cord plug into input jack (right or left) is imperfect.	Connect the plugs into both jacks completely.
Sound volume is small.	The muting switch is kept at '−20dB'.	Set the muting switch to '0dB'.
	The volume control is kept closed.	Rotate the volume control clockwise to increase the sound volume.
Hum noise is generated at 'phono' mode.	There is no connection between the earth terminal of this amplifier and of the turntable.	Connect the earth terminal of the unit to that of the turntable.
The reproduced sound (human voices or the like) does not come to the center between two loudspeakers.	The connection polarities plus (+) and minus (−) of the speaker cords of the amplifier are reverse.	Make appropriate the polarities of speaker cords.

REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

REF. NO.	PART NO.	DESCRIPTION	CODE
		INTEGRATED CIRCUITS	
IC501, IC502	RH-IX1066AFZZ	Power	BA
		TRANSISTORS	
Q201, Q202	VS2SK68A///1F	1st Equalizer Amp (2SK68A)	AF
Q203, Q204	VS2SA841-B/-1	2nd Equalizer Amp (2SA841BL)	AE
Q205, Q206	VS2SA841-B/-1	3rd Equalizer Amp (2SA841BL)	AE
Q301, Q302	VS2SC945LP/-1	Differential Amp (2SC945LP)	AC
Q303, Q304	VS2SC945LP/-1	Differential Amp (2SC945LP)	AC
Q305, Q306	VS2SA733-P/-1	Tone Amp (2SA733P)	AD
Q307	VS2SC1166-Y-3	Constant Voltage (Positive Voltage) (2SC1166YL)	AE
Q308	VS2SA661-Y/-3	Constant Voltage (Negative Voltage) (2SA661YL)	AE
Q401	VS2SC945LP/-1	Muting Control (2SC945LP)	AC
Q402	VS2SC945LP/-1	Muting Discharge (2SC945LP)	AC
Q403, Q404	VS2SC945LP/-1	Muting Signal Control (2SC945LP)	AC
Q501, Q502	VS2SA561-Y/-1	Constant Current (2SA561YL)	AG
Q503, Q504	VS2SA798-G/-1	Differential Amp (2SA798G)	AF
Q505, Q506	VS2SA818-Y/-1	Pre Driver/Constant Current (2SA818YL)	AH
Q507, Q508	VS2SC1628-Y-1	Pre Driver (2SC1628YL)	AH
		DIODES	
D401	VHD1S1555V/1G	Protection, Q403, Q404 (1S1555)	
D402	VHD1S1555V/1G	Protection, Q402 (1S1555)	
D403	VHD10E1////-F	Power Rectifier (10E-1)	AC
D501, D502	VHVHV46-G//-1	Constant Current (HV-46)	AD
D601, D602	VHD1S1555V/1G	Protection, D603, D604 (1S1555)	
D603, D604	VHD1N60////-1	Rectifier (1N60)	AB
D605, D606	VHD1S1555V/1G	Logarithmic Compressor (1S1555)	
D701, D702, D703, D704	VHDSR3AM-4/-1	Power Rectifier	AF
ZD301, ZD302	VHEWZ220///-1	Constant Voltage (WZ220)	AD
		CONTROLS	
VR301, (A, B)	RVR-B0145AFZZ	100K(B) ohm, Volume Control	AN
VR302, (A, B)	RVR-C0055AFZZ	100K(C) ohm, Bass Control	AK
VR303, (A, B)	RVR-C0055AFZZ	100K(C) ohm, Treble Control	AK
VR304, (A, B)	RVR-B0144AFZZ	100K(B) ohm, Balance Control	AF
VR601, VR602	RVR-M0126AFZZ	5K(B) ohm, Output Meter Adjustment	AC
		TRANSFORMER	
T901	RTRNP0472AFZZ	Power	
		RESISTORS (Unless otherwise specified are 1/4W, ±5%, Carbon type)	
R101, R102	VRD-ST2EE394J	390K ohm	
R103, R104	VRD-ST2EE104J	100K ohm	
R201, R202	VRD-ST2EE471J	470 ohm	
R203, R204	VRD-ST2EE473J	47K ohm	
R205, R206	VRD-ST2EE823J	82K ohm	
R207, R208	VRD-ST2EE153J	15K ohm	
R209, R210	VRD-ST2EE122J	1.2K ohm	
R211, R212	VRD-ST2EE823J	82K ohm	
R213, R214	VRD-ST2EE682J	6.8K ohm	
R215, R216	VRD-ST2EE474J	470K ohm	
R217, R218	VRD-ST2EE683J	68K ohm	
R219, R220	VRD-ST2EE472J	4.7K ohm	
R221, R222	VRD-ST2EE823J	82K ohm	
R223, R224	VRD-ST2EE473J	47K ohm	
R225, R226	VRD-ST2EE222J	2.2K ohm	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
R227, R228	VRD-ST2EE334J	330K ohm	
R301, R302	VRD-ST2EE332J	3.3K ohm	
R303, R304	VRD-ST2EE563J	56K ohm	
R305, R306	VRD-ST2EE682J	6.8K ohm	
R307, R308	VRD-ST2EE333J	33K ohm	
R309, R310	VRD-ST2EE103J	10K ohm	
R311, R312	VRD-ST2EE332J	3.3K ohm	
R313, R314	VRD-ST2EE224J	220K ohm	
R315, R316	VRD-ST2EE822J	8.2K ohm	
R317, R318	VRD-ST2EE124J	120K ohm	
R319, R320	VRD-ST2EE472J	4.7K ohm	
R321, R322	VRD-ST2EE103J	10K ohm	
R323, R324	VRD-ST2EE184J	180K ohm	
R325, R326	VRD-ST2EE273J	27K ohm	
R327, R328	VRD-ST2EE332J	3.3K ohm	
R329, R330	VRD-ST2EE472J	4.7K ohm	
R331, R332	VRD-ST2EE822J	8.2K ohm	
R333, R334	VRD-ST2EE122J	1.2K ohm	
R335, R336	VRD-ST2EE102J	1K ohm	
R337, R338	VRD-ST2EE472J	4.7K ohm	
R339, R340	RR-XZ1015AFZZ	150 ohm, 1/4W, Fuseble	
R341, R342	VRD-ST2EE682J	6.8K ohm	
R343, R344	VRD-ST2HD222J	2.2K ohm, 1/2W, ±5%, Carbon	
R345, R346	VRD-ST2EE334J	330K ohm	
R401	VRD-ST2EE223J	22K ohm	
R402	VRD-ST2EE683J	68K ohm	
R403	VRD-ST2EE563J	56K ohm	
R404	VRD-ST2EE332J	3.3K ohm	
R405	VRD-ST2EE471J	470 ohm	
R406	VRD-ST2EE123J	12K ohm	
R407	VRD-ST2EE563J	56K ohm	
R408	VRD-ST2EE822K	8.2K ohm	
R409	VRD-ST2EE222J	2.2K ohm	
R410	VRD-ST2EE222J	2.2K ohm	
R501, R502	VRD-ST2EE152J	1.5K ohm	
R503, R504	VRD-ST2EE223J	22K ohm	
R505, R506	VRD-ST2EE821J	820 ohm	
R507, R508	VRD-ST2EE331J	330 ohm	
R509, R510	VRD-ST2EE821J	820 ohm	
R511, R512	VRD-ST2EE223J	22K ohm	
R513, R514	VRD-ST2EE272J	2.7K ohm	
R515, R516	VRD-ST2EE223J	22K ohm	
R517, R518	VRD-ST2EE101J	100 ohm	
R519, R520	RR-XZ1006AFZZ	100 ohm, 1/4W, Fuseble	AB
R521, R522	VRD-ST2EE180J	18 ohm	
R523, R524	VRD-ST2EE563J	56K ohm	
R525, R526	RR-XZ1015AFZZ	150 ohm, 1/4W, Fuseble	
R527, R528	VRG-ST2HA100J	10 ohm, 1/2W, ± 5%, Fuseble	
R529, R530	VRD-ST2EE682J	6.8K ohm	
R601, R602	VRD-ST2EE182J	1K ohm	AA
R603, R604	VRD-ST2EE121J	120 ohm	
R605, R606	VRD-ST2EE222J	2.2K ohm	
R701	RR-XZ0001AFZZ	39 ohm, 1/4W, Fuseble	AB
R901, R902	VRS-PT3AB221K	220 ohm, 1W, ±10%, Oxide Film	
		CAPACITORS	
C101	VCKZPU1HF403Z	.04MFD, 50V, +80 −20%, Ceramic	
C201, C202	VCCSPU1HL470K	47PF, 50V, ±10%, Ceramic	
C203, C204	VCKZPU1HF102Z	.001MFD, 50V, +80 −20%, Ceramic	
C205, C206	VCEAAU0JW337Y	330MFD, 6.3V, +50 −10%, Electrolytic	AC
C207, C208	VCEAAU1EW227Y	220MFD, 25V, +50 −10%, Electrolytic	AC
C209, C210	VCCSPU1HL3R0C	3PF, 50V, ±.25PF, Ceramic	
C211, C212	VCQYKU2AM562G	.0056MFD, 100V, +50 −10%, Mylar	
C213, C214	VCQYKU2AM162G	.0016MFD, 100V, +50 −10%, Mylar	
C217, C218	VCEAAU1CW106Y	10MFD, 16V, +50 −10%, Electrolytic	AB
C219, C220	VCEAAU1HW335A	3.3MFD, 50V, +75 −10%, Electrolytic	AB
C221, C222	VCKZPU1HF403Z	.04MFD, 50V, +80 −20%, Ceramic	
C223, C224	VCCSPU1HL221K	220PF, 50V, ±10%, Ceramic	
C301, C302	VCCSPU1HL561K	560PF, 50V, ±10%, Ceramic	
C303, C304	VCQYKU1HM683K	.068MFD, 50V, ±10%, Mylar	AC
C305, C306	VCEAAU1HW105A	1MFD, 50V, +75 −10%, Electrolytic	AB

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
C307, C308	VCCSPU1HL220K	22PF, 50V, ±10%, Ceramic	
C309, C310	VCKZPU1HF102Z	.001MFD, 50V, +80 −20%, Ceramic	
C311, C312	VCCSPU1HL470K	47PF, 50V, ±10%, Ceramic	
C313, C314	VCQYKU1HM183J	.018MFD, 50V, ±5%, Mylar	AC
C315, C316	VCQYKU1HM104J	.1MFD, 50V, ±5%, Mylar	AD
C317, C318	VCEAAU1CW106Y	10MFD, 16V, +50 −10%, Electrolytic	AB
C319, C320	VCEAAU1HW335A	3.3MFD, 50V, +75 −10%, Electrolytic	AB
C321, C322	VCQYKU1HM182J	.0018MFD, 50V, ±5%, Mylar	AC
C323, C324	VCQYKU1HM103J	.01MFD, 50V, ±5%, Mylar	AB
C325, C326	VCCSPU1HL121K	120PF, 50V, ±10%, Ceramic	
C327, C328	VCEAAU1VW107Y	100MFD, 35V, +50 −10%, Electrolytic	AD
C329, C330	VCEAAU1VW107Y	100MFD, 35V, +50 −10%, Electrolytic	AD
C331, C332	VCEAAU1HW107Y	100MFD, 50V, +50 −10%, Electrolytic	AD
C333, C334	VCEALU1HW224M	.22MFD 50V, ±20%, Electrolytic	AB
C401	VCEAAU1HW227Y	220MFD, 50V, +50 −10%, Electrolytic	AD
C402	VCEAAU1HW106Y	10MFD, 50V, +50 −10%, Electrolytic	AC
C403	VCQYKU2AM104M	.1MFD, 100V, ±20%, Mylar	AD
C501, C502	VCEAAU1HW335A	3.3MFD, 50V, +75 −10%, Electrolytic	AB
C503, C504	VCCSPU1HL121K	120PF, 50V, ±10%, Ceramic	
C505, C506	VCEAAU1AW476Y	47MFD, 10V, +50 −10%, Electrolytic	AB
C507, C508	VCEAAU1HW107Y	100MFD, 50V, +50 −10%, Electrolytic	AD
C509, C510	VCEAAU1HW476Y	47MFD, 50V, +50 −10%, Electrolytic	AC
C511, C512	VCEAAU1CW476Y	47MFD, 16V, +50 −10%, Electrolytic	AC
C513, C514	VCCSPU1HL5R0C	5PF, 50V, ±.25PF, Ceramic	
C515, C516	VCCSPU1HL150K	15PF, 50V, ±10%, Ceramic	
C517, C518	VCCSPU1HL470K	47PF, 50V, ±10%, Ceramic	
C519, C520	VCKZPU1HF403Z	.04MFD, 50V, +80 −20%, Ceramic	
C521, C522	VCEAAU1HW105A	1MFD, 50V, +75 −10%, Electrolytic	AB
C601, C602	VCEAAU1CW106Y	10MFD, 16V, +50 −10%, Electrolytic	AC
C603, C604	VCEAAU1HW335A	3.3MFD, 50V, +75 −10%, Electrolytic	AB
C701, C702, C703, C704	VCQYKU2AM104M	.1MFD, 100V, ±20%, Mylar	AD
C705	RC-EZ1005AFZZ	6800MFD x 2, 50V, Electrolytic	BA
C706	VCEAAU1HW477Y	470MFD, 50V, +50 −10%, Electrolytic	
C901	RC-PZ062CAFZZ	.033MFD, 450V(AC)	

MISCELLANEOUS

REF. NO.	PART NO.	DESCRIPTION	CODE
	GCOVA1075AFSC	Cover, Tape-Dubbing/ Tape-Monitor	
	GCOVA1076AFSC	Cover, Power/Low Cut/ Loudness	
	HPNLC3274AFSA	Front Panel	
	PSPAS0008SGSA	Spacer, Muting Knob	AB
	QACCB0050AF0V	AC Supply Cord (SUK)	AM
	QACCL4001SE08	AC Supply Cord (SCA)	AS
	QACCN0001AGZZ	AC Supply Cord (SEMKO)	AQ
	QACCS9001SE00	AC Supply Cord (SEV)	AG
	QPLGA0205AGZZ	Plug, AC Supply Cord (SEV)	AK
	QACCV0001AGZZ	AC Supply Cord (KEMA)	AP
	QACCZ0002AG08	AC Supply Cord	AF
	QPLGA0201AGZZ	Plug, AC Supply Cord	AE
	QACCZ0002TA0F	AC Supply Cord (Audio Photo Club)	AF
SO105	QCNCW078CAFZZ	Socket, Main Voltage Selector	AC
	QTIPZ0052AFZZ	Tip, Main Voltage Selector Socket	AA
	LANGQ0506AFSA	Bracket, Terminal	
	LANGQ0510AFZZ	Bracket, Main Voltage Selector	
	QFSHP1001AGZZ	Fuse Holder (Terminal Bracket)	AH
	QLUGL0402AGZZ	Lug Terminal, 4 Pin	AD
SO104	QSOCD2553AFZZ	Socket, REC/PB (DIN)	AD
SO105	QSOCE0410AGZZ	Switch, Mains Voltage Selector	AH
SO102	QSOCJ2458AFZZ	Socket, Tape 1 (REC/PB)	AE
SO101	QSOCJ2660AFZZ	Socket, Inputs (PHONO/ TUNER/AUX)	AG
SW901	QSW-B9070AFZZ	Switch, Power	—
	QTANN0150AFZZ	GND Terminal	AD
TM901, TM902	QTANS0451AFZZ	Speakers Terminal	AG
	QFSHD1001AGZZ	Fuse Holder	AB
	PFLT-0318AF00	Felt, Chassis	
SW304, SW305	QSW-B0051AFZZ	Switch, Low Cut/ Loudness	AK
SW301, SW302	QSW-B0054AFZZ	Switch, Tape-Dubbing/ Tape-Monitor	AL
	LX-WZ0019AFFW	Lug, GND Terminal	AA
SO103	QSOCJ2458AFZZ	Socket, Tape 2 (REC/PB)	AE
SW303	QSW-P0139AFZZ	Switch, Muting	AG
	GLEGP0050AF00	Leg	AC
	LBSHZ0001AF00	Bushing, Output Meter Lamp	AA
	LCHSM0260AFZZ	Chassis	
	LHLDW1060AFZZ	Wire Holder	AA
	PFLT-0318AF00	Felt, Cabinet Top Settle	
	LX-NZ3030SEFN	Nut, Headphone Jack	AA
	PCUSS0005AG00	Cushion, Cabinet Top	AA
	PCUSG0069AF00	Cushion, Set Protection	AB
	PCUSS0076AFZZ	Cushion, Output Meter	AA
	PREFL0058AFZZ	Panel, Output Meter	
J901	QJAKJ0001SGZZ	Jack, Headphones	AF
SW101	QSW-R0106AFZZ	Switch, Selector	AK
SW902	QSW-R0142AFZZ	Switch, Speakers	
PL701, PL702	RLMPM0062AFZZ	Output Meter Lamp	AE
ME1, ME2	RMTRL0136AFSA	Output Meter	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
	PRDAR0141AFFW	Heat Sink	
	LANGF0392AFZZ	Bracket, Heat Sink Settle	AB
	LBSHC0002AGZZ	Bushing, AC Cord (SCA, SUK)	AB
	LBSHC0004AGZZ	Bushing, AC Cord (SEMKO, KEMA)	AC
	LBSHC0007AFZZ	Bushing, AC Cord (SEV, Audio photo club)	AB
	LHLDW1052AFZZ	Wire Holder	AA
F901	QFS-C122CAGNI	Fuse, 1.25AT	AE
F801	QFS-C321CAGNI	Fuse, 315mAT	AE
F501, F502	QFS-C322CAGNI	Fuse, 3.15AT	AE
	QFS-C252CAGNI	Fuse, 2.5AT	AE
	GCAB-3033AFSA	Cabinet, Top	
	GFTAU3064AFZZ	Cabinet, Bottom	AD
	HDECW0054AFSA	Decoration Plate (Left)	
	HDECW0055AFSA	Decoration Plate (Right)	
	QPWBF0563AFZZ	Printed Wiring Board	
	RH-QX1002AFZZ	Positive Chracteristic Thermistor	AG
	JKNBM0136AFSE	Knob, Muting	AC
	JKNBN0316AFSA	Knob, Volume	AK
	JKNBN0330AFSA	Knob, Bass/Treble/Speakers/ Balance/Selector	AH
	JKNBP0070AFSA	Knob, Power/Low Cut/ Loudness/Tape-Dubbing/ Tape-Monitor	AH
	PSHEF0110AFZZ	Sheet, Light Cut off	AA
	QPLGS0102AGZZ	Short Type Plug	AD
	LX-LZ0051AF00	Rivet, Speakers Terminal Settle	
	LX-WZ5065AGFE	Washer, Fuse Holder	AB
	QLUGP0104AGZZ	Terminal Strip, Wire	AA
	QLUGP0111CEFW	Terminal Strip, Test Point	AA
	SPAKA0457AFZZ	Packing Add.	
	SPAKC0981AFZZ	Packing Case	
	SSAKA0007SEZZ	Polyethylene Bag	AA
	SSAKH0015SEZZ	Polyethylene Bag	AB
	PCOVZ8050AFZZ	Cover, Output Meter Lamp	

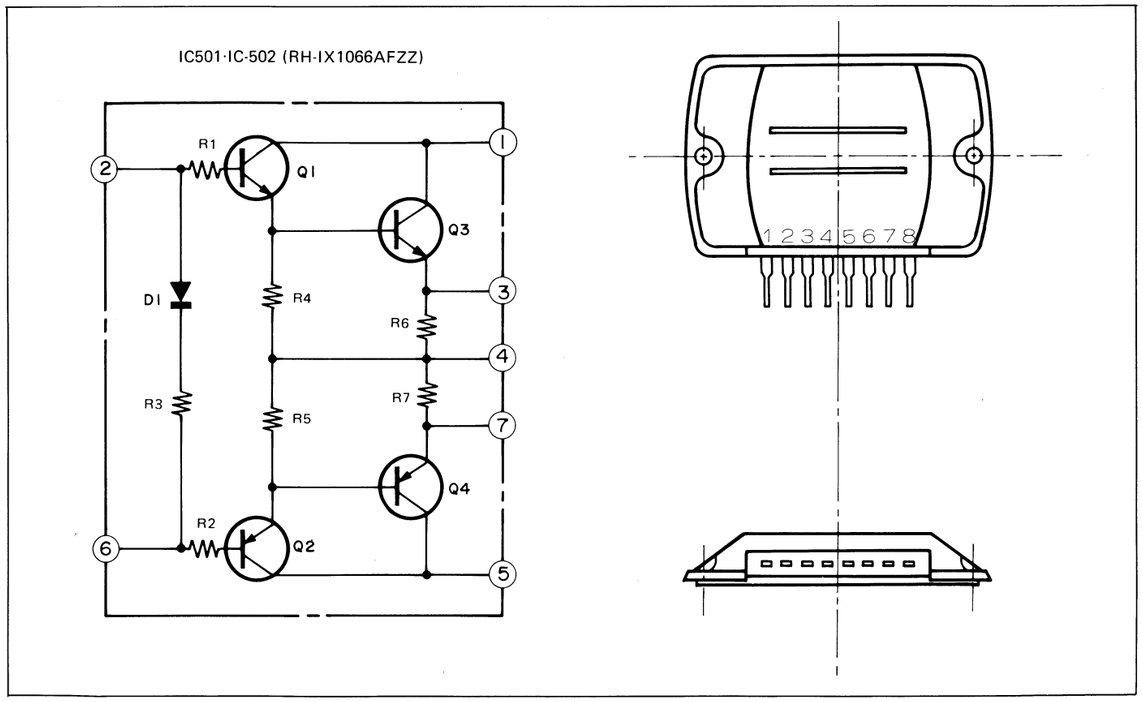


Figure 16 EQUIVALENT OF INTEGRATED CIRCUIT

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